SWIFT
TRADE MARK.

SWIFT
TRADE MARK.

HIGHEST AWARD GRANTED:

DIPLOMA OF HONOR HEALTH INTERNATIONAL EXHIBITION.

SWIFT & SON'S
New Patent Microscope,

MADE IN VARIOUS FORMS FOR

HISTOLOGY, PHYSIOLOGY, BACTERIOLOGY & PETROLOGY,

With Suitable Apparatus Adaptea for Prosecuting the above Studies.

This Instrument has been supplied to the following Hospitals and Institutions—

Guy's, St. Thomas', Bartholomews', Middlesex and London Hospitals; London University Science & Art Departments, and City Guild's South Kensington and also to the County Council Technical Schools.

In order to produce this Microscope at its nominal cost, Messrs. Swift & Son have laid down suitable machinery and have made steel templates so that all the parts are shaped and made to uniform size, skilled labour of experienced workmen only being required in fitting up and finishing, thus effecting a great saving of time in its construction.

UNIVERSITY OPTICAL WORKS,
81, TOTTENHAM COURT ROAD,
LONDON, W.

Telegraphic Address—
"Prisms," London.

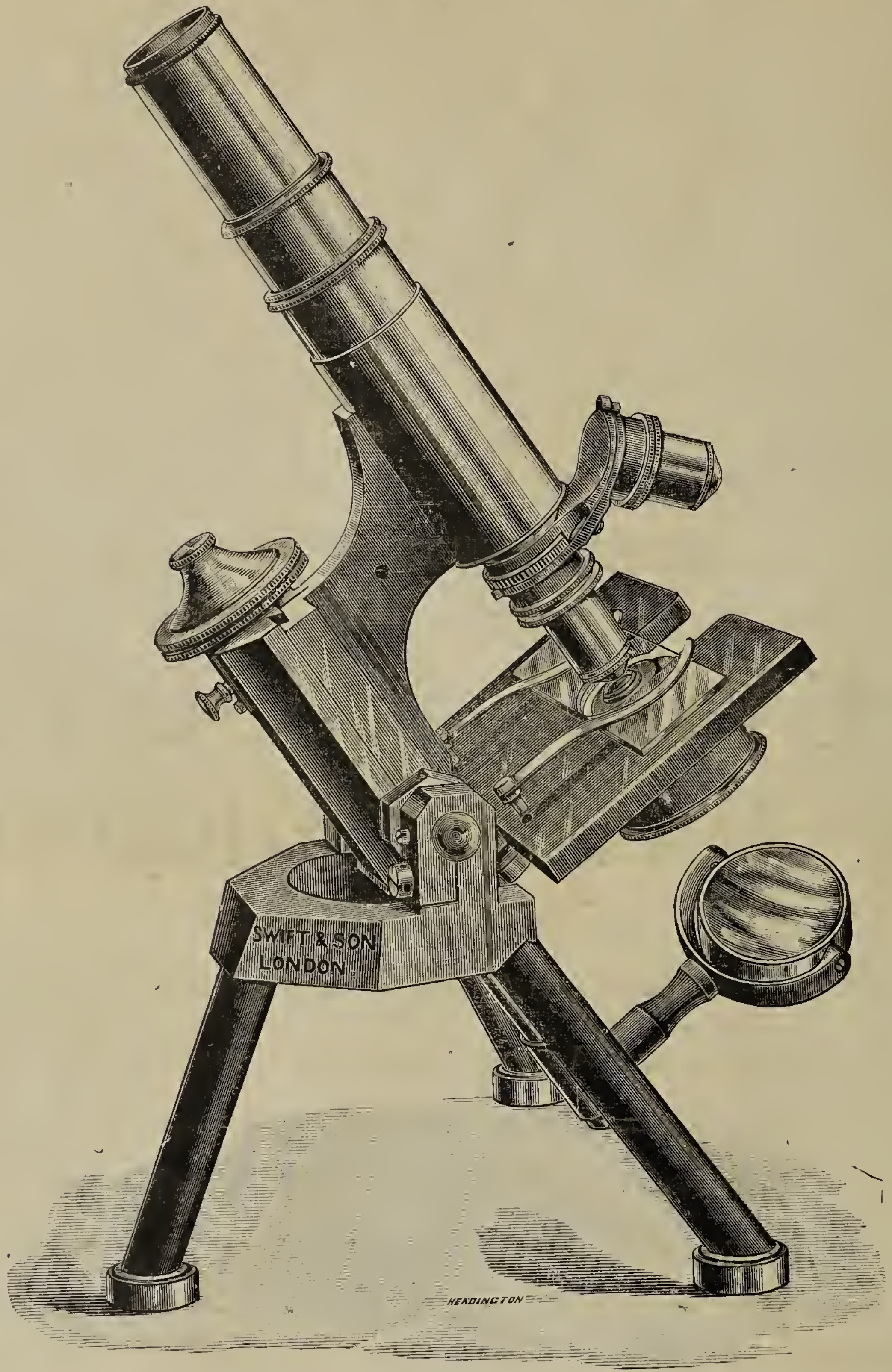
R. Madley, Steam Printer 151, Whitfield Street, Fitzroy Square, W.

1870 ?

SWIFT & SON'S
New Histological & Physiological Microscope

Double Nose-piece in position, as shewn in woodcut, Extra, **10/-**

Dimensions of the Microscope given on next page.



Differential fine adjustment screw in place of one described below, fitted to either of these instruments, Extra, **5/-**

Fig. 1.

THIS Instrument has been specially designed to meet the requirements of Students, either of medicine or those engaged in general biological investigation.

Fig. 1 shews the Microscope in its simplest form, and its chief features are as follows :—Optical Tube, sliding in a cloth lined fitting for rapid focussing; Fine Adjustment, actuated by a milled head on the top of the pillar, giving the extremely slow motion required for focussing a $\frac{1}{12}$th or higher powers. This fine adjustment is of entirely new construction; the action being direct, it is perfectly steady with highest amplification, and it is so made that it is almost impossible for this essential part of the instrument to get out of order by long and rough usage. Moreover, the fine thread screw of the adjustment is compensating, so that any loss of time caused by wear is entirely prevented.

The stage is of large size and of the horse-shoe form, and is provided with spring clips; below is a standard guage fitting for receiving all illuminating apparatus. Plane and concave mirrors. The whole is mounted on a modified form of POWELL & LEALAND's tripod stand, so highly eulogised by REV. DR. DALLENGER, F.R.S. in his revised edition of "*Carpenter on the Microscope.*"

If the old form of tripod stand is preferred to the one shewn in illustration, it can be substituted at an extra cost of 5/-

Price in Cabinet with two Achromatic Objectives, **aa** N.A. 0.17 equivalent focus 1-inch and D N.A. 0.83 equivalent focus $\frac{1}{6}$-inch Eye Piece and Iris Diaphragm. ... **£5 5 0**

Or if preferred AA N.A. 0.30 equivalent focus, $\frac{2}{3}$-inch or B N.A. 0.35 equivalent focus $\frac{1}{2}$-inch may be substituted for the **aa** without extra charge.

5475

New Histological & Physiological Microscope.

The Optical Tubes of all the Microscopes in this circular measure when the draw-tube is fully extended, 205-*m/m* and when closed down 160-*m/m*.

List of Additional Apparatus.

	£	s.	d.
Extra Eye-pieces each	0	7	6
1/8-Objective, 110°	2	10	0
1/12-Homo Immersion N.A. 1.25	5	5	0
Abbe Condenser with Iris Diaphragm	2	2	0
Achromatic Abbe Condenser with Iris Diaphragm	3	10	0
Or with stops for dark ground illumination and oblique light ...	4	0	0
Camera Lucida ...	0	6	0
Wollaston's ditto	0	16	0
Spot Lens	0	6	0
Double Nose-piece as shewn in woodcut if required, extra	0	15	0

This condenser is specially constructed for critical images and photo-micrography.

Chief Dimensions of New Histological and Physiological Microscope.

Draw-Tube, closed, 11-ins.

Diameter of Optical Tube. 1⅜-inch.

Stage. 4-inch × 3¼-inch

Height from table to under side of stage, 3¾-inch.

Diameter of course focussing milled head, 1¾-inch.

Fine adjustment milled head and mirrors, 1¾-inch dia.

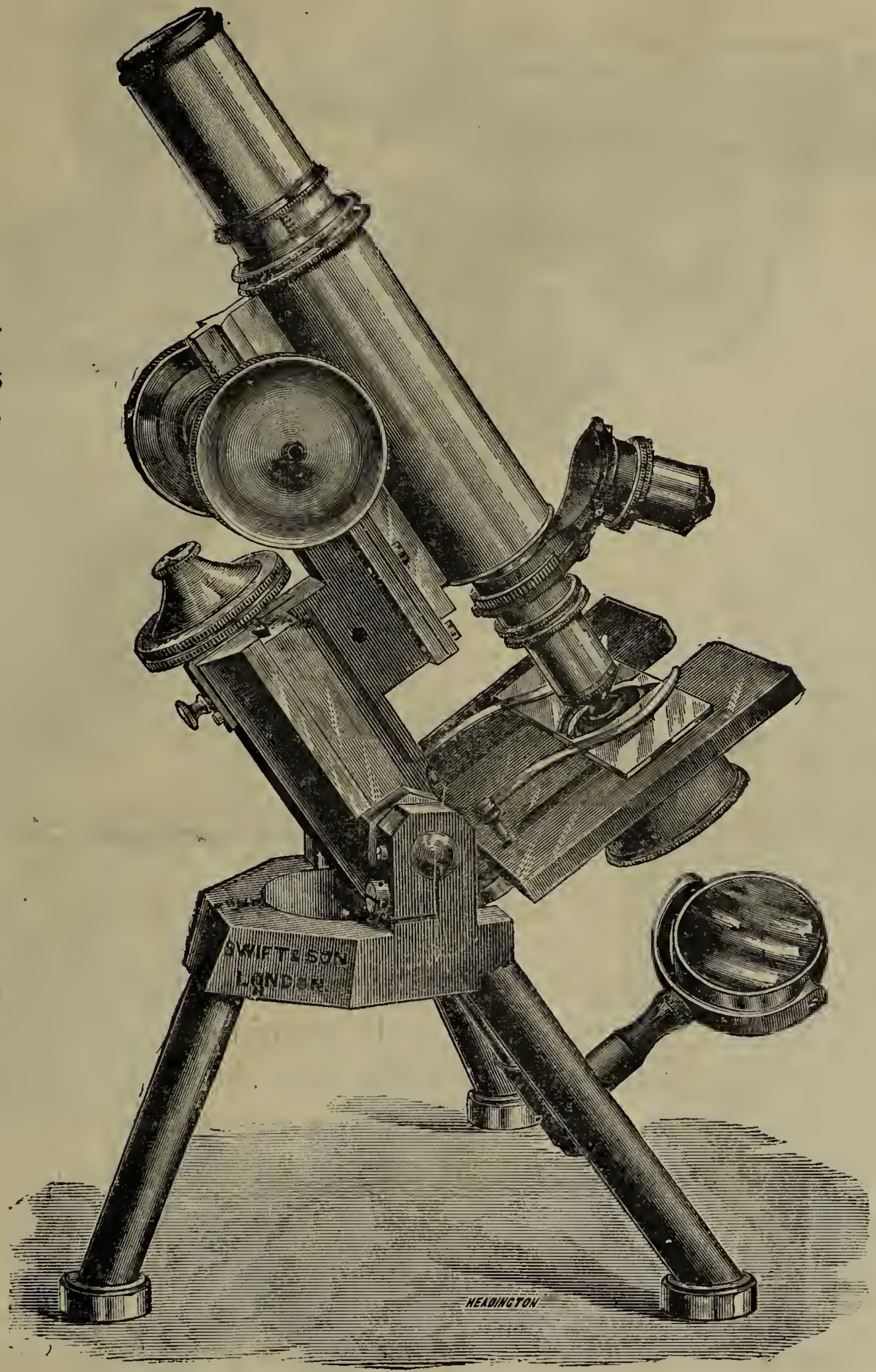


Fig. 2.

FIG 2 shews the Microscope with the addition of spiral rack and pinion adjustment (of which Messrs. Swift & Son are the original patentees), in place of the sliding tube as in Fig. 1.

This arrangement possesses the advantage of greater ease and precision in focussing the object under examination, and it likewise ensures the objective being kept in the exact centre of the diaphragm or other substage apparatus, a point of considerable importance, more particularly when a double nose-piece for carrying two objectives of different power is used, as shewn in the engraving.

Price with same appliances as in Fig. 1 £6 15 0

New Histological and Physiological Microscope.

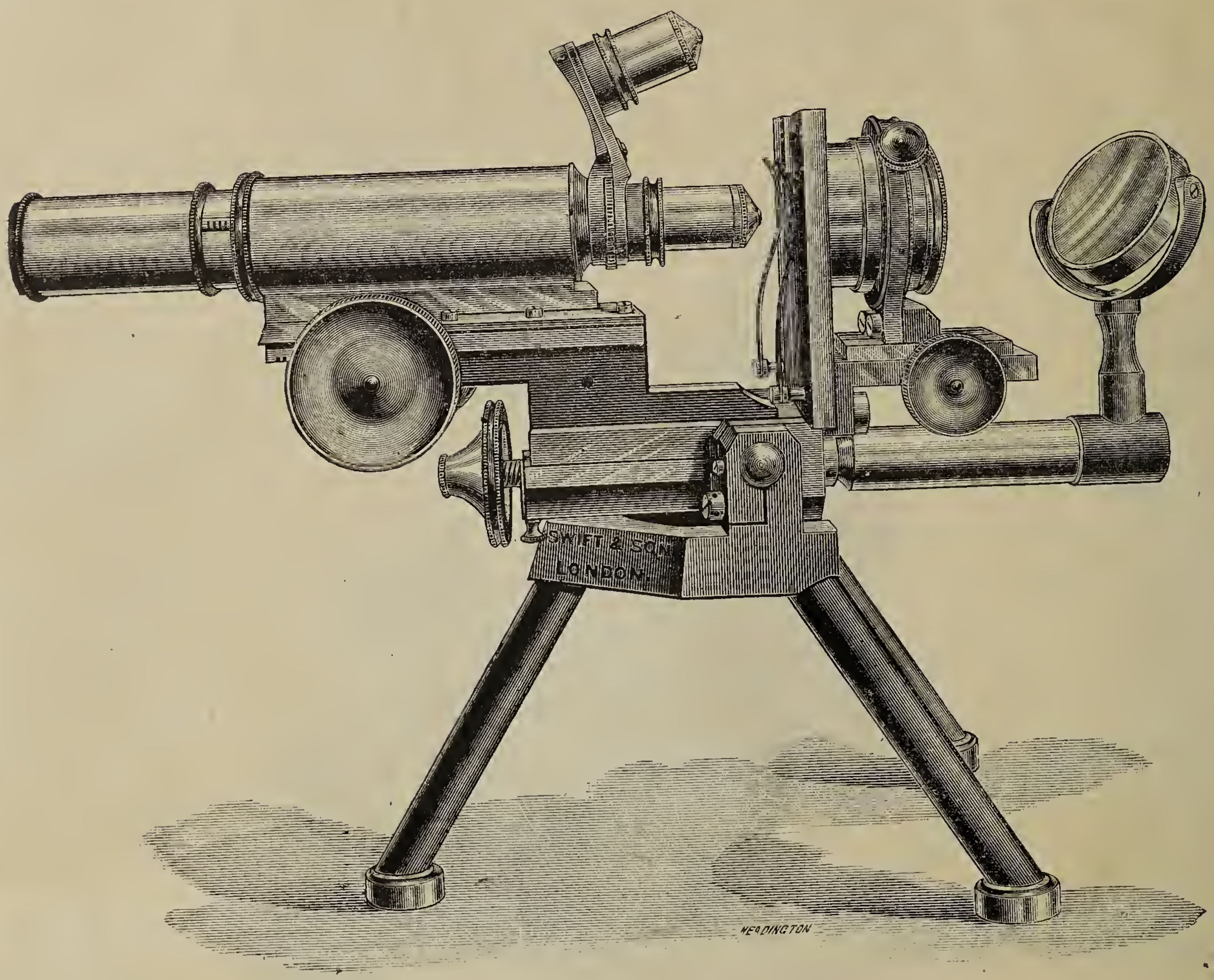


Fig. 3.

FIG 3 is the same Microscope as Fig 2, but with the addition of a sub-stage having universal adjustments for centering and focussing the illuminating apparatus, which movements are indispensable if the best results are to be obtained from the optical portion of the instrument. The extra cost of this addition is £1 18s. 0d All parts being made to guage, any understage apparatus used with Fig. 1 instrument will fit the sub-stage of Fig. 3 accurately, without requiring the least alteration.

The illustration shows the microscope in the horizontal position, and from it an idea may be gained of the stability afforded by the special form of tripod stand. It will be found, on trial, that it requires considerable force at either end to overturn or even tilt the instrument. The pillar of the fine adjustment rests squarely on the top of the tripod, and the centre of gravity falls well within the centre of the base of support, which together render the instrument extremely steady in this position, a matter of great importance when the Microscope is used for Photo-Micrography.

LIST OF ADDITIONAL APPARATUS.

COMPENSATING EYE-PIECES, Magnifying	4	6	8	12	18 times
PRICE	**20/-**	**20/-**	**30/-**	**30/-**	**25/-**

These Eye-Pieces work exceedingly well for Photo-Micrography where great magnification is required.

PROJECTION EYE-PIECES, specially designed for Photo-Micrography, magnifying 2 and 4 times, each **£2 0 0**

New $\frac{1}{12}$ Oil Immersion N.A. 1.30 specially computed for the highest class of Research & Photo-Micrography **£5 5 0**

The results obtained with this Lens are fully equal to Continental Lenses costing as much again.

Swift & Son's Recently Patented 4-legged Microscope Stand.

In order to remove any doubt as to the durability of the Swinging Leg Attachment of their Fig. 4 Microscope, Messrs. Swift & Son think it advisable to explain its construction, which is shewn in Figs. A and B.

The swing leg is attached to the framework of the tripod by the screw Fig. A, which is provided with a powerful steel spiral spring, compressed between two steel collets when the screw is driven home, as shown in Fig. B.

The expansion of this spring will obviously take up and compensate automatically any wear and tear that is likely to occur between the bearing surfaces, and it is therefore impossible for the fitting to get loose.

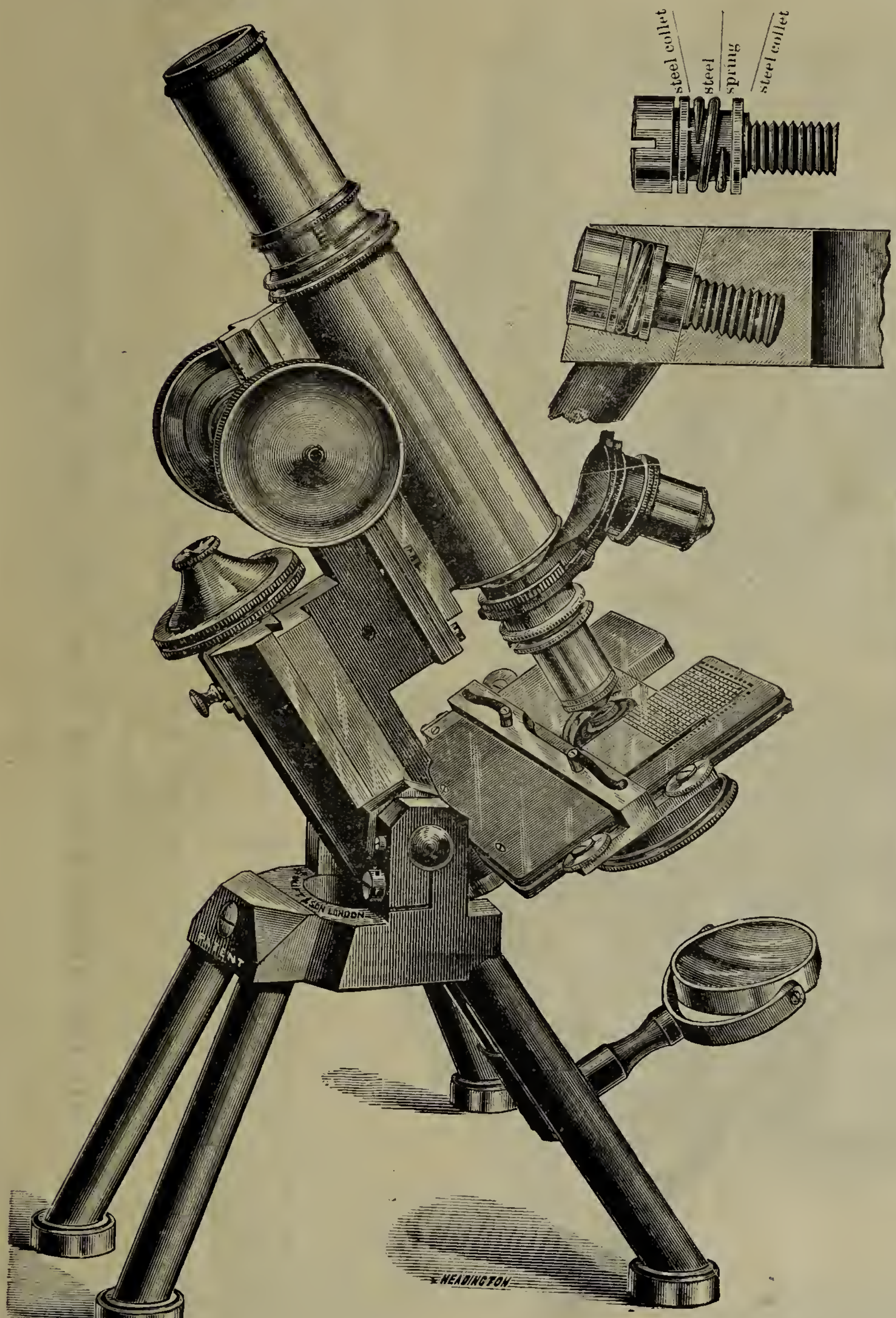


Fig. A.

Fig. B.

Fig. 4. (shews the stand in use)

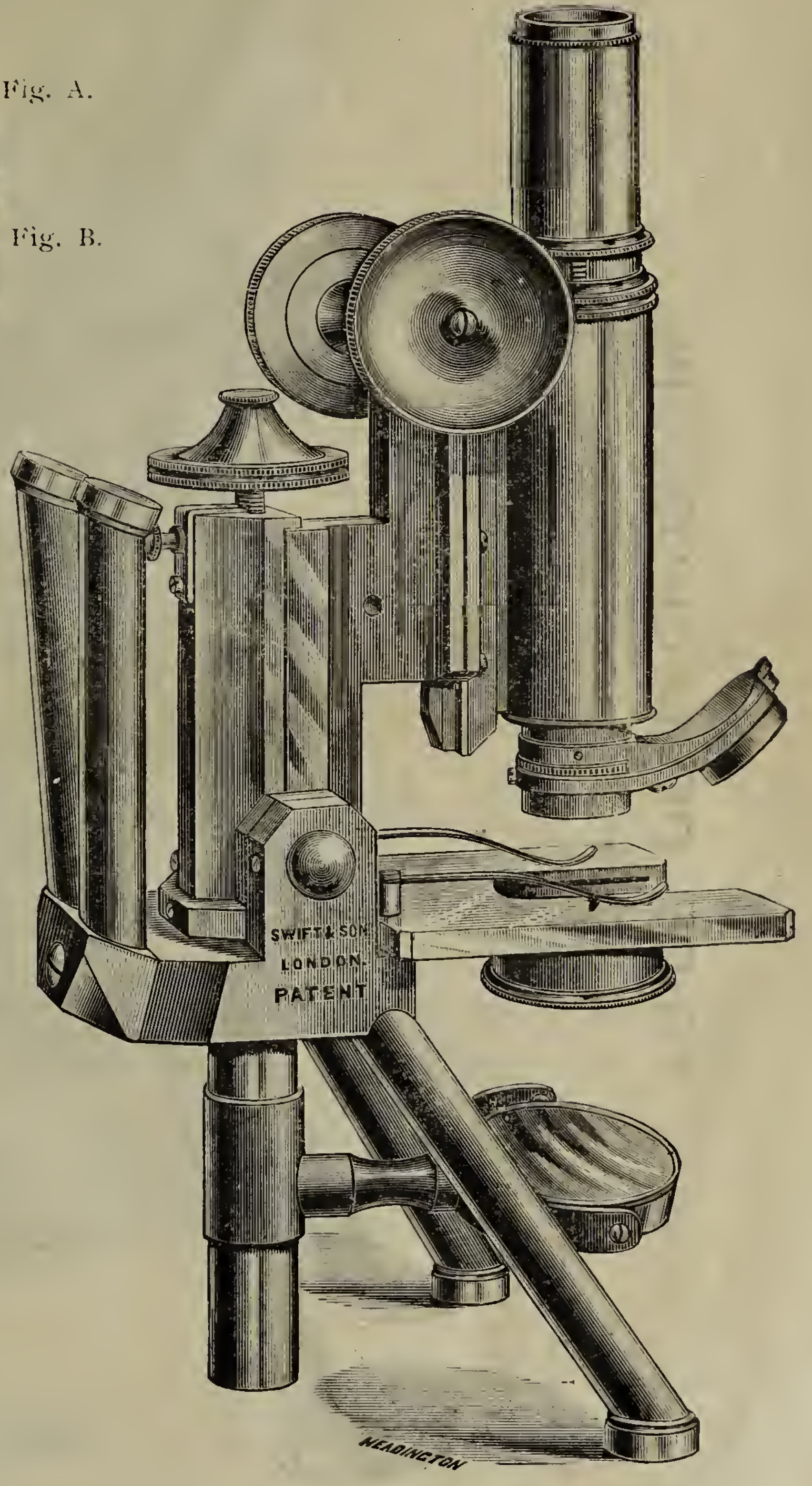


Fig. 5. (shew the stand folded for packing).

Although the ordinary Tripod is the best form for steadiness, there is still a possibility in small or moderately sized instruments of lateral tilt or overturn, by a sudden push in a direction at right angles to either side of the triangle formed by the Tripod.

Our new form of 4-Legged Stand almost entirely prevents this risk, so much so, that when the body of the microscope is inclined in the horizontal position, it requires considerable efforts to upset it.

The two back legs are made to swing on a pivot, so that they can adjust themselves to any uneven surface. The pivot on which they work is made so as to compensate for wear and tear, therefore there is no liability of this fitting becoming loose when the stand is in a position for use, the joint is as rigid as solid metal. Another great advantage in our 4-Legged Stand is, that when the back legs are reversed for packing, it fits into a box 2-inches less in width than with a fixed tripod.

PRICE of microscope with Swinging Leg, $\frac{2}{3}$ N.A. 0.30 and $\frac{1}{6}$ N.A. 0.83 Objectives, Eye Piece, Iris Diaphragm, in case £7 0 0
Size of Cabinet for above Microscope—12 inches long, 6-inches wide, and the same in depth.

Figs, 2, 3 and 4 have their stages prepared for receiving the addition of Messrs Swifts' Patent Roller Object Clip, as shewn in Fig. 12 and the stages are also ruled with rectangular *m m* divisions for the purpose of readily finding any part of an object that has been previously examined   Additional cost of Patent Roller Clip shewn in position in Fig. 12 .. .. £0 10 6

SWIFT & SON'S
Portable Histological and Physiological Microscope.

PRICE OF MICROSCOPE.

With Eye-Piece in cabinet, Monocular, including Messrs. Swifts' Patent Roller Object Clip	£10 10 0
Binocular, with additional Eye-Piece	3 0 0

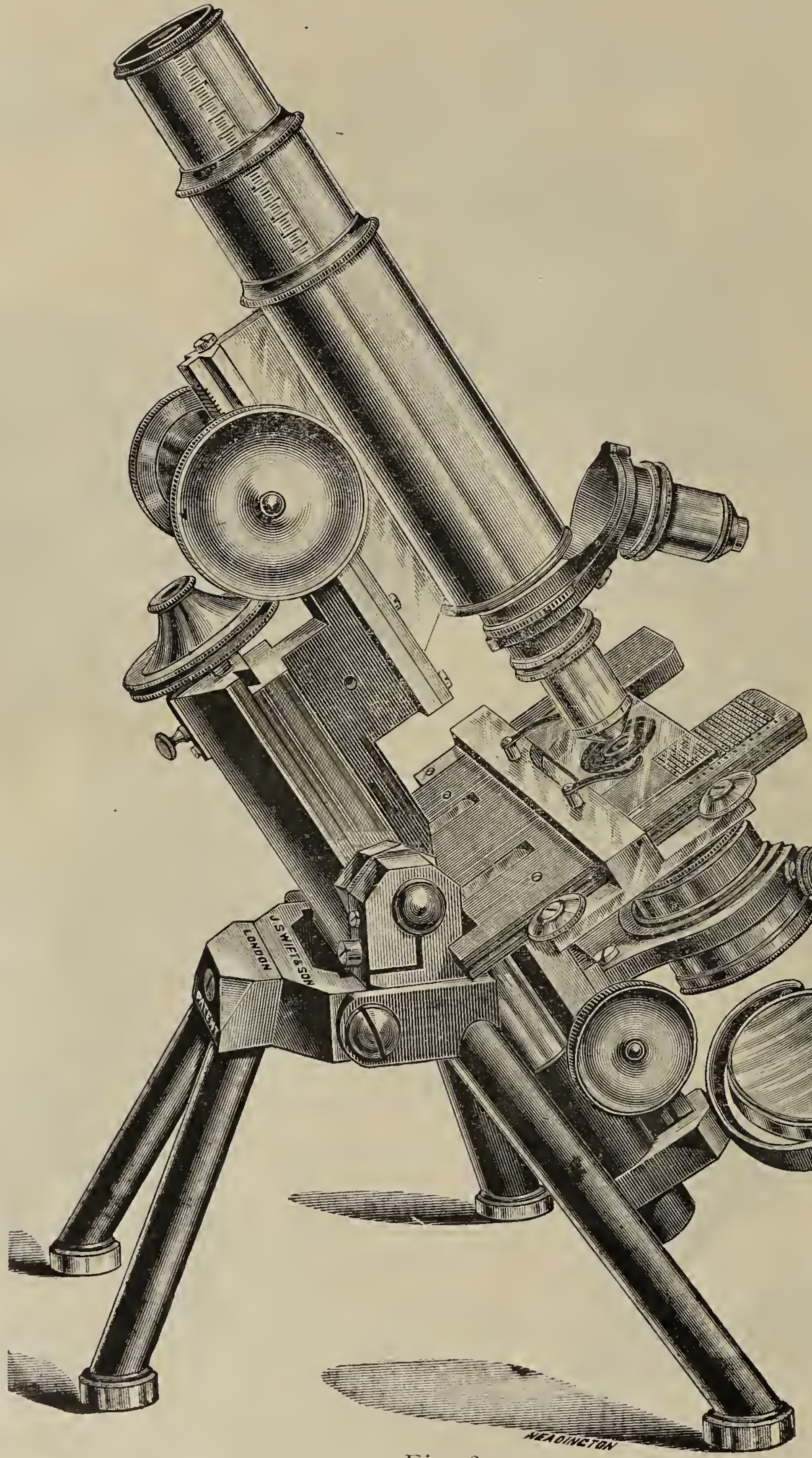


Fig. 6.

Double Nose-Piece	£0 15 0
Abbe Achromatic Condenser with stops for dark ground illumination, etc. ...	4 0 0
1-inch. Objective, N.A. 1.70	1 13 0
⅙-inch „ 0.83	2 0 0
Life Box	£0 5 0
Extra Eye-Piece	0 7 6
Camera Lucida...	0 6 0
Zoophyte Trough	0 1 0

All the above Pack in Case with the Microscope.

DIMENSIONS OF MICROSCOPE SET UP FOR USE.

Height from base of instrument, vertical, with draw-tube closed	10 inches
Height from base to axes or trunnions ...	5 „
Height from under side of stage ...	4¼ „
Spread between two front feet of tripod	8 „
Spread from back to front feet	7 inches
Width between two back legs	3 „
Length of optical tube when draw-tubes are fully extended	10 „
Each draw-tube is divided to *m/m*. Width of Stage	3⅜ × 3½ „

SWIFT & SON'S

Portable Histological and Physiological Microscope,

SHEWN FOLDED AND PACKED IN CASE.

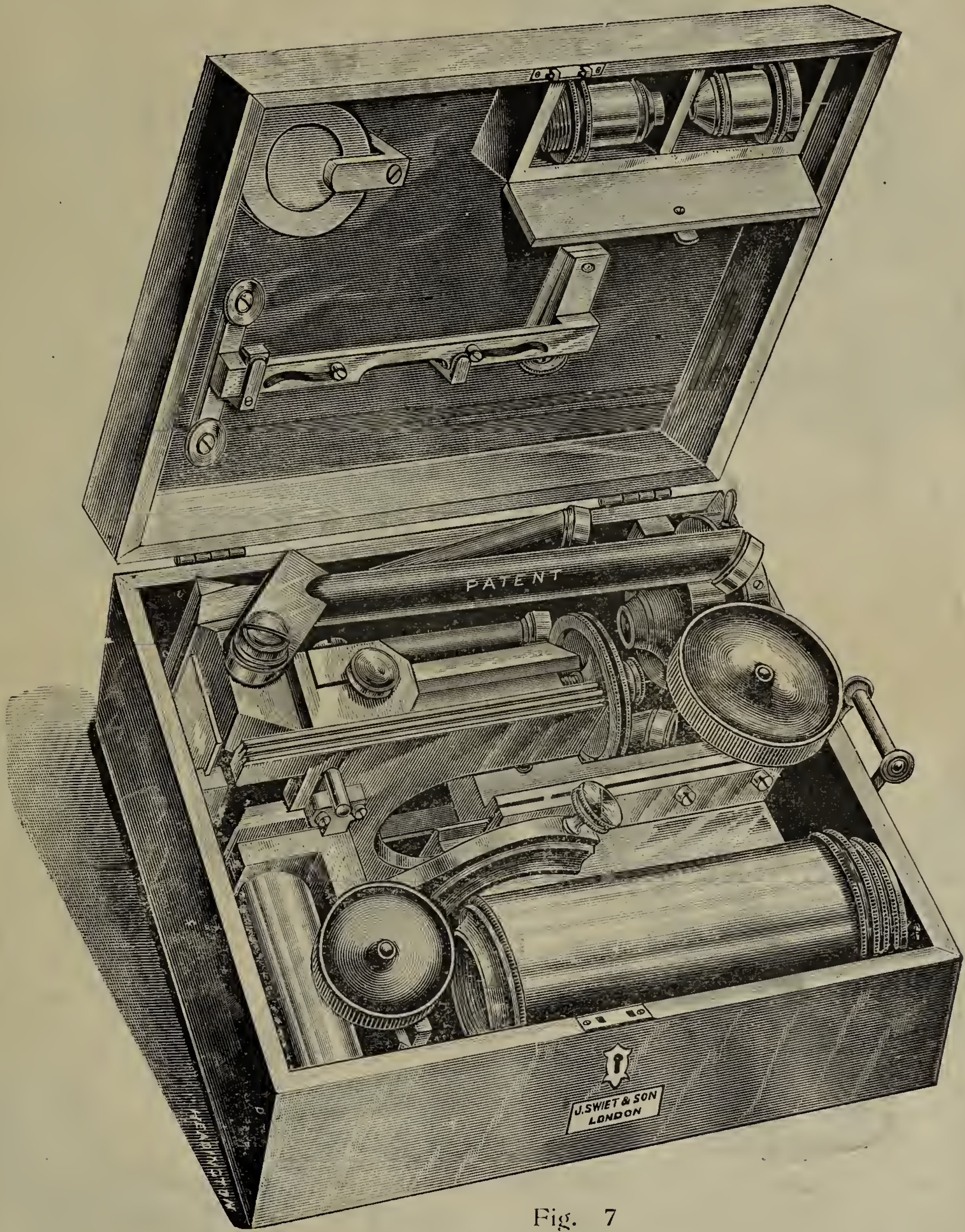


Fig. 7

FOR the convenience of those who may desire an extremely portable microscope for travelling with, JAMES SWIFT & SON have constructed their Histological Microscope in such a way as to only require a case half the size of their Ordinary Folding Leg Microscope, viz:—12in. × 6½ in.

This instrument is equally rigid and solid when set up as Fig. 4. The front legs are pivoted with strong screws and bolts, and the part to which they fit abuts against a shoulder under the axes or trunnions of the tripod, so that when the legs are brought into position for use they cannot possibly shift by any downward or lateral pressure. The joints of the folding stage are made on the same principle, and therefore equally, rigid. The optical tube has two sliding draws for portability, which are divided to *m/m* and the fine adjustment is fitted with Messrs. SWIFTS' patent differential screw. Fig. 6 shews the microscope set up for use and Fig. 7 shews it folded, packed in its case with Double Nose-Piece, Achromatic Condenser, Sliding Object Clip, Sub-stage, two Objectives ($\frac{2}{3}$ & $\frac{1}{6}$), two Oculars, Zoophyte Trough, etc. The great advantage of this microscope over any other folding or portable form hitherto made is, that there are no parts to detach when packed in its case, or to add or screw together when set up for use. It is the most substantial and portable microscope extant, none of its working parts are liable to become deranged or suffer by long usage. As lightness is of great consideration in portable microscopes made for travelling purposes. Messrs. SWIFT make the above in aluminium, the weight of which, when set up for use as shewn in Fig. 6, is 3-lbs., or in case 5-lbs.

SWIFT & SON'S
Students' Petrological Microscope.

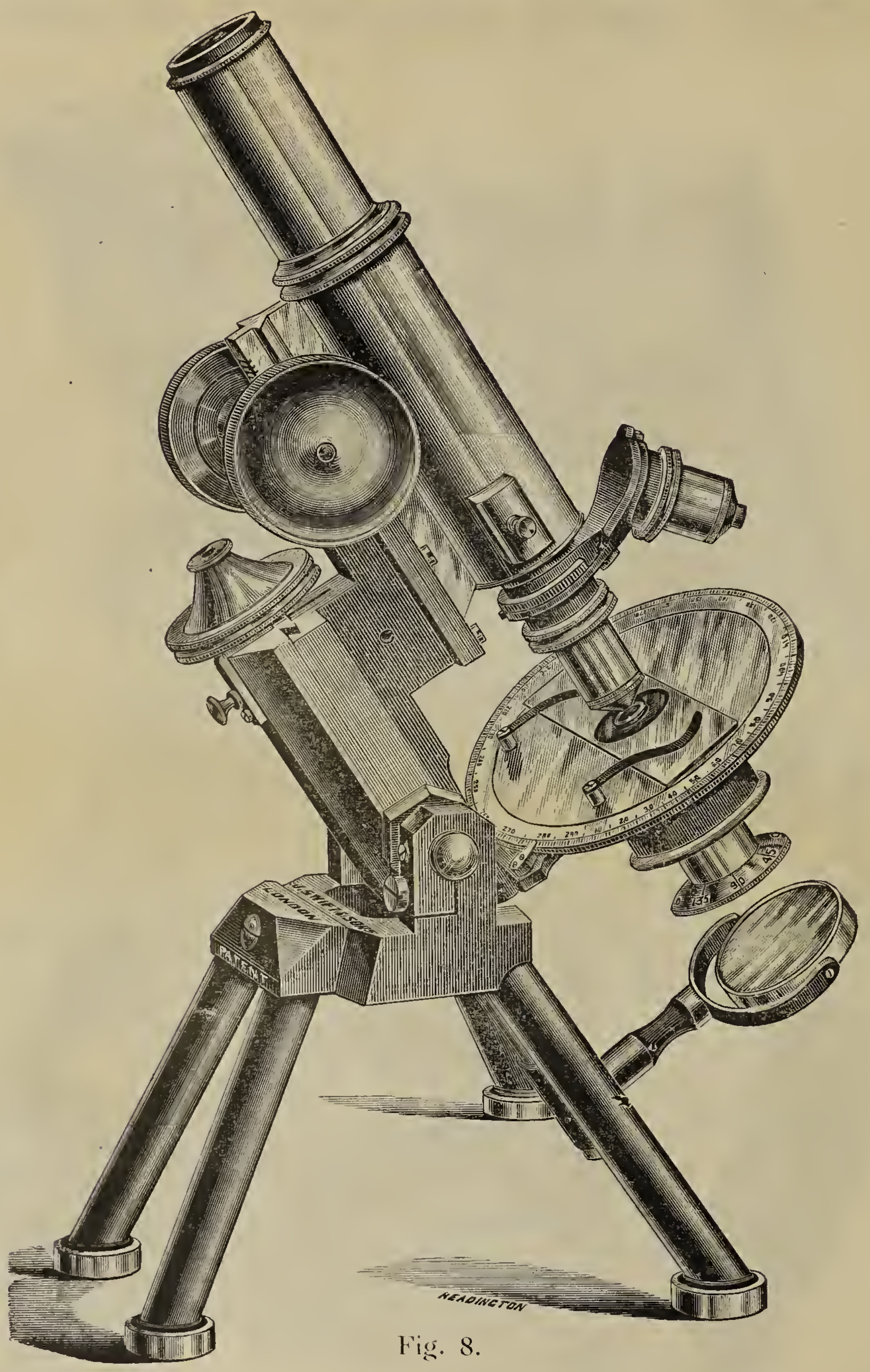


Fig. 8.

WITH coarse adjustment by spiral rack and pinion, fine adjustant by direct action screw, revolving stage divided into 360° with index; Polariser Flange also divided to every 45°, with spring catch to indicate the crossing of prisms. Convergent system of lenses made adaptable to the polariser.

The Analyser slides in the Optical Tube, which can be readily pushed in and out of the field as desired.

The Eye-Piece is spider lined, the wires of which are accurately adjusted to an extinguishing crystal.

The Polarising Prism is removable so that any ordinary under-stage illuminating apparatus can be fitted in its place, the fitting being the usual standard guage 1½ inch diameter.

The Microscope with 1-inch objective and eye-piece in cabinet as above described		£9	0	0
Double Nose Piece		0	15	0
Self-Centreing Nose Piece (if required)		1	1	0
Extra Eye-Pieces	each	0	7	6
If Spider Lined	extra	0	6	0
"Bertrand" Lens for shewing rings and brushes in crystals, with adapter		0	12	0
¼-inch Objective 90° A Aperture		2	6	0
$\frac{1}{5}$-inch Objective 0.87 N.A.		3	0	0

This glass is specially designed for bringing wide angle biaxial crystals into the field of the eye piece.

Quartz Wedge with adapter – £1. **Undulation Plate, fitting same adapter**—5/-

Klein's Quartz Plate—10/-

Diameter of Revolving Stage, 4 inches. Other measurements same as given on page 3.

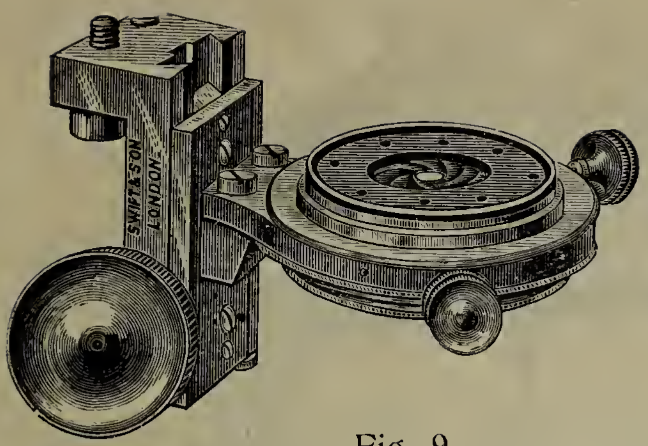


Fig. 9.

Fig. 9 shews the substage detached. This can be fixed at any subsequent time in place of the ordinary substage tube of Fig. 10, without returning the instrument to us, as instructions are sent with it to enable any unskilled person to fit it accurately central with the optic axis of the objective, the same screws being adapted to both pieces. In this case the substage tube is returnable and 3/- will be allowed for it if in good condition A reduced form of Abbe Condenser is also supplied for 10/-, which screws into the upper side of the Iris diaphragm, a standard size aperture & thread being made in each diaphragm for this purpose

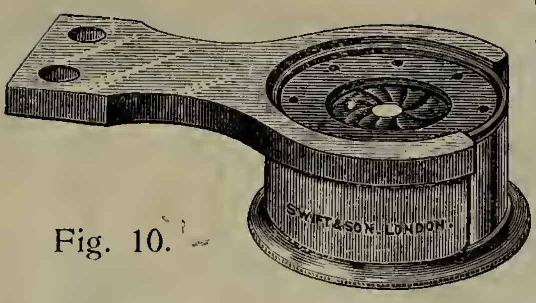

SWIFT & SON. LONDON.

Fig. 10.

SWIFTS' NEW PATENT MECHANICAL STAGE

(Fig 11), which can be adapted to either of their Histological Microscopes, excepting fig. 1, unless at an extra cost. The usual dove-tail rectangular slides, rack and pinion & quick-thread screws are entirely dispensed with. It can be readily slid from the instrument when not wanted and again slid on when required, thus leaving the ordinary flat stage and clip springs available for rough work. The advantages of this stage are that it will not readily get out of order by corrosion from fluids running into the fittings, and loss of time and back lash cannot possibly occur as with the usual form of Mechanical stage.

Price **£2 10 0**

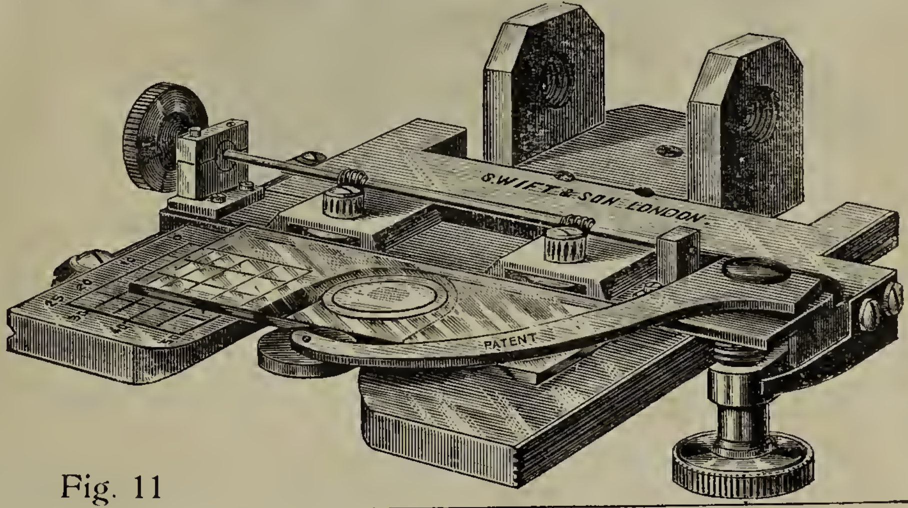


Fig. 11

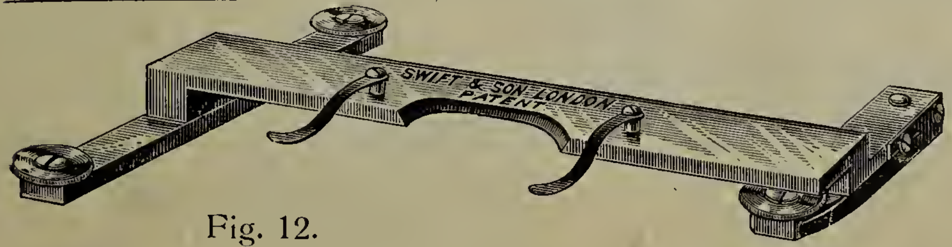


Fig. 12.

SWIFTS' PATENT ROLLER OBJECT CLIP

which can be adapted to either figs. 2, 3, or 4 Histological Microscopes without the necessity of returning the microscope for the purpose,

Price **10/6**

SWIFTS' IMPROVED FORM OF ABBE CONDENSER

comprising all the movements of the established form, but it is constructed in a more convenient and portable way with iris diaphragm and cells for stops and blue glass modifier; it has quick thread screw motion for bringing the iris diaphragm, etc., out of the axis of the instrument, for oblique light the diaphragm also turns on an eccentric arm for the insertion of stops and the whole revolves independently of its fitting in the sub-stage.

Price with Chromatic Optical Combination **£4 0 0**

Extra for Abbe Achromatic Combination in place of Chromatic one **1 0 0**

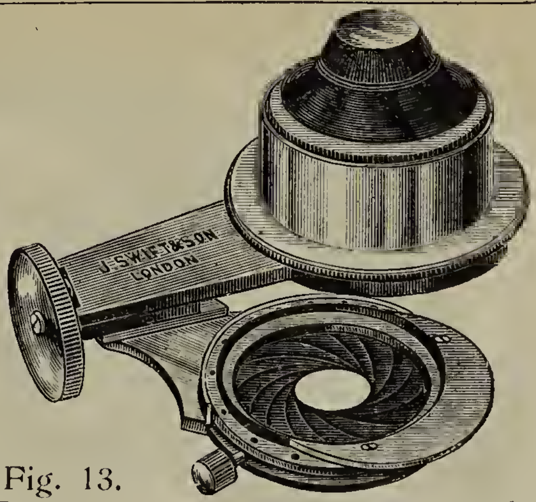


Fig. 13.

Prof. Shäfer's Hot Water Circulation Stage.

for maintaining uniform temperature between 80° & 100° fahr.; to any degree between these points it can be accurately adjusted. ... ... **Price £3 0 0**

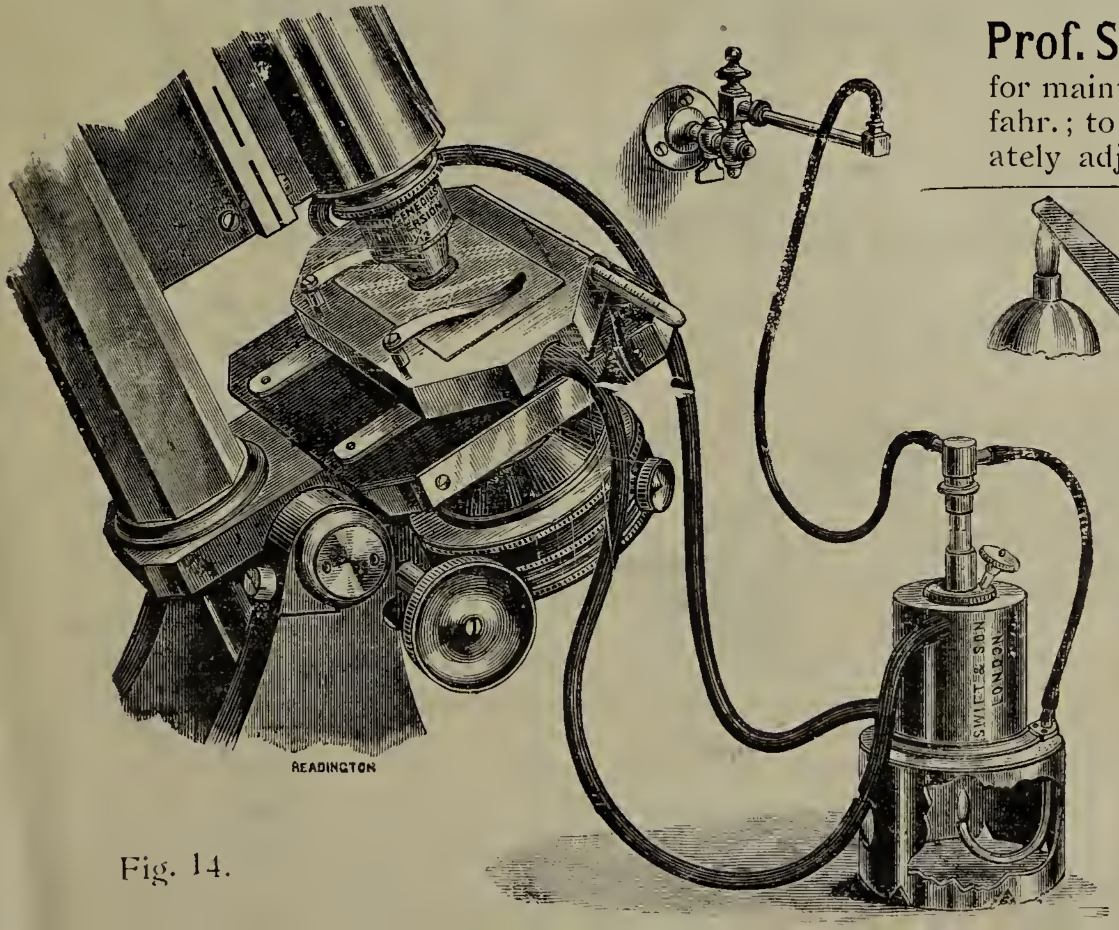


Fig. 14.

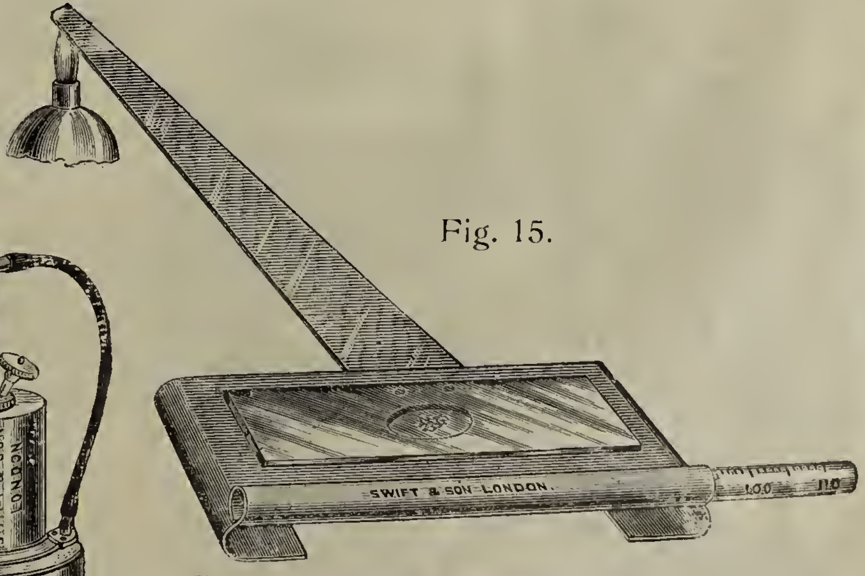


Fig. 15.

Warm Stage for use with Spirit Lamp 2/6

With Clinical Thermometer as shewn 5/-

Swifts' Freezing Microtomes

Fig. 16.

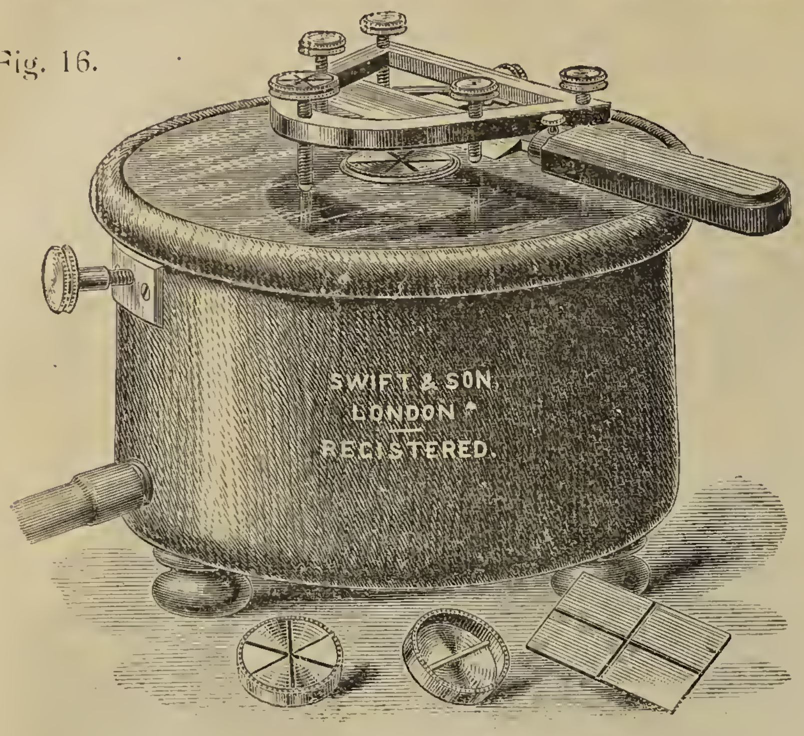


Fig. 16—Price complete to freeze with ice	£2	14	0
,, 17 – Ether Ditto	3	3	0
Extra Ice Chamber to use with fig. 17, instead of Ether	1	1	0

Both these machines can be used for embedding with paraffin, celloidin or other medium.

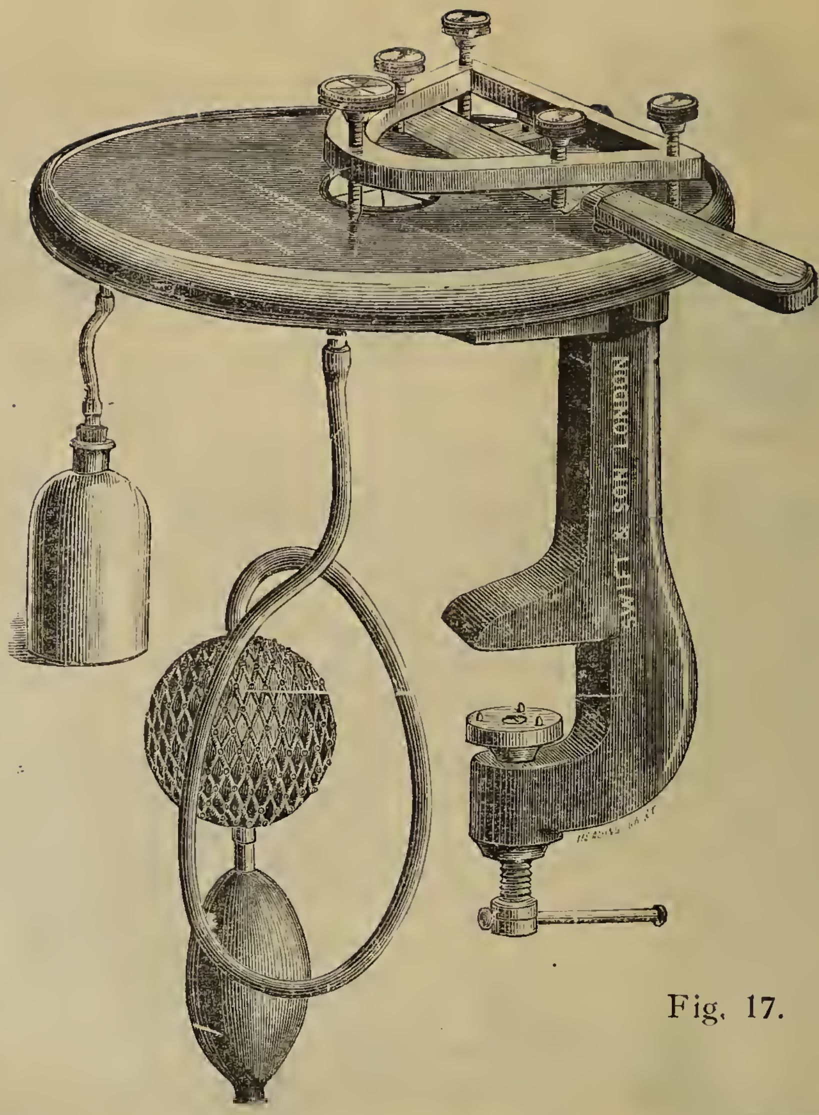


Fig. 17.

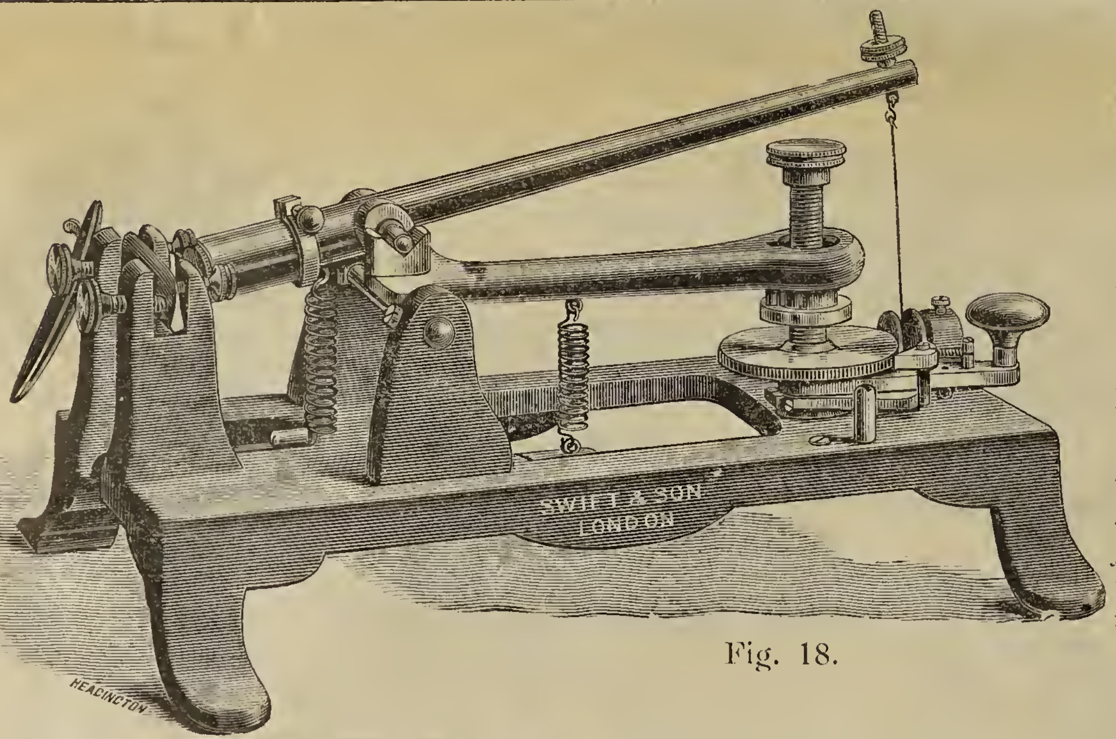


Fig. 18.

THE CAMBRIDGE
Rocking Microtome.

AS IN ILLUSTRATION (FIG. 18).

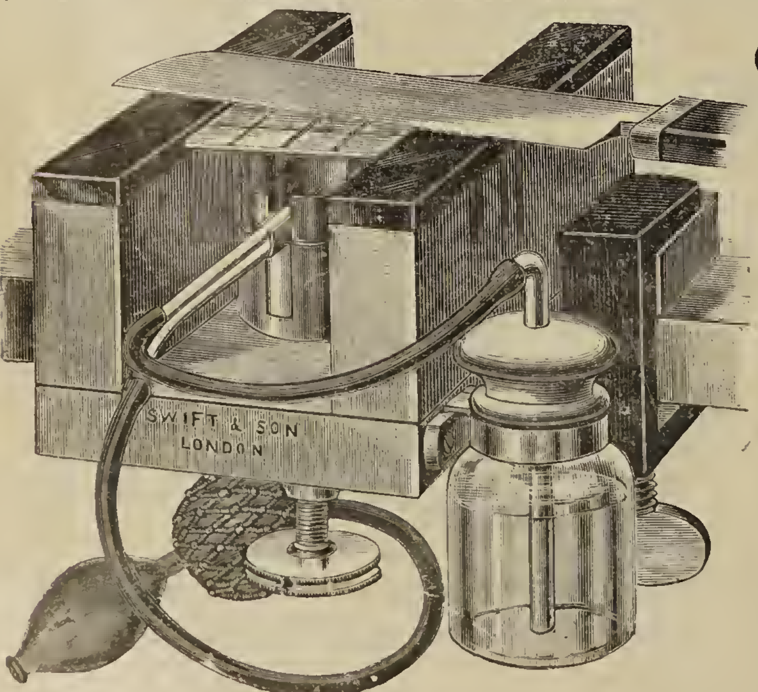
Price **£3 15 0**

Or with the addition of divided arc for registering thickness of sections **Extra 6/-**

Orientating piece for arranging the preparation at any angle **Extra. 15/-**

We also make the Microtome for cutting with celloidin under spirit. The knife is so mounted that it can be fixed at any angle from 0° to 90°, part of it is also made to invert so that the razor or knife can be immersed together with the preparation in a spirit trough when cutting in celloidin.

Price ... **£11 0 0**



Cathcart's Freezing Microtomes.

Fig. 20—Complete with Bellows and Knife	£1	0	0
Plane Iron	0	2	9

Ordinary Section Machine.

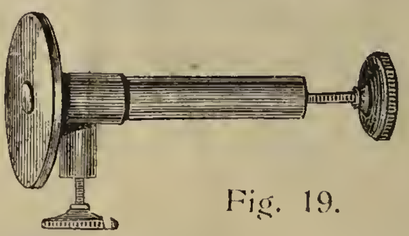


Fig. 19.

Fig 19	10/-
With Clamp for fixing to table ...	16/-

CAMERA LUCIDÆ.

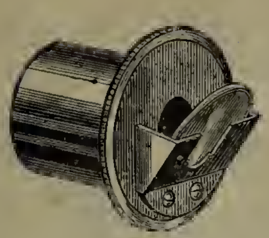


Fig. 21

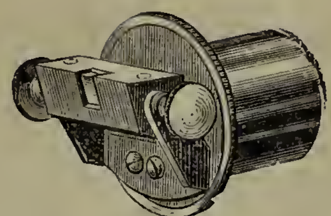


Fig. 22.

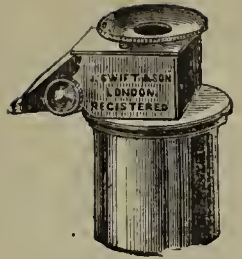


Fig 23.

FIG 21 is a neutral tint reflector for drawing the magnified image in the microscope, it is the simplest form of Camera Lucida known, and the easiest to use; but it is only suitable for low or medium power objectives. For use with higher powers we would beg to recommend Fig. 22, which gives sufficient light, thus enabling the most minute details of the object to be drawn, and it has the advantage of erecting the image. It is the most reliable form of of Camera Lucida known,but it requires practice before proficiency is obtained. It can only be used with the microscope in the Horizontal position. When it is necessary to draw with the microscope in the vertical or inclined position, Fig. 23 is suitable for the purpose. This is necessary where the object to be drawn is liable to shift its position by floating in fluid, in the case of yeast cells, etc. This Camera Lucida is precisely on same principle as the rachet or Abbe form used for same purpose, but it is less bulky and far more convenient and easier to use.

When the above form of camera is used, the paper upon which the object is received should be tilted to the same plane as the stage of microscope upon which the object rests, as this will prevent any marginal distortion.

Fig. 21, **6/-** Fig. 22, **16/-** Fig. 23, **24/-**

Photo-Micrographic Apparatus.

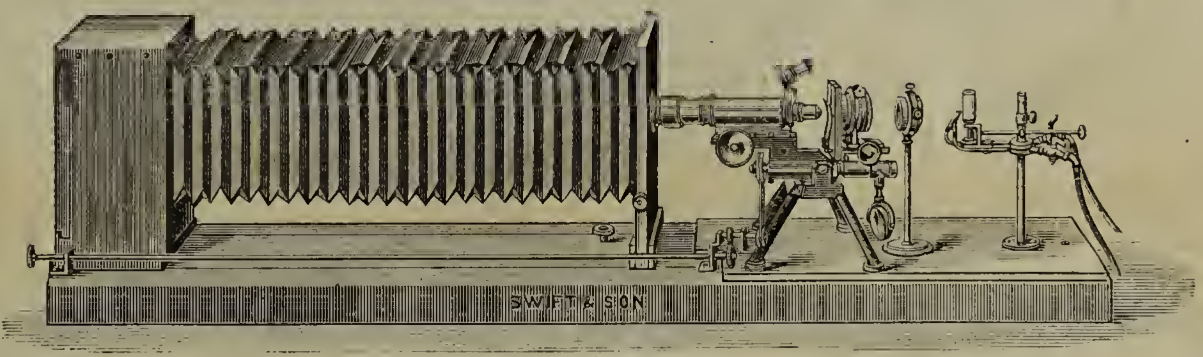


Fig. 24.

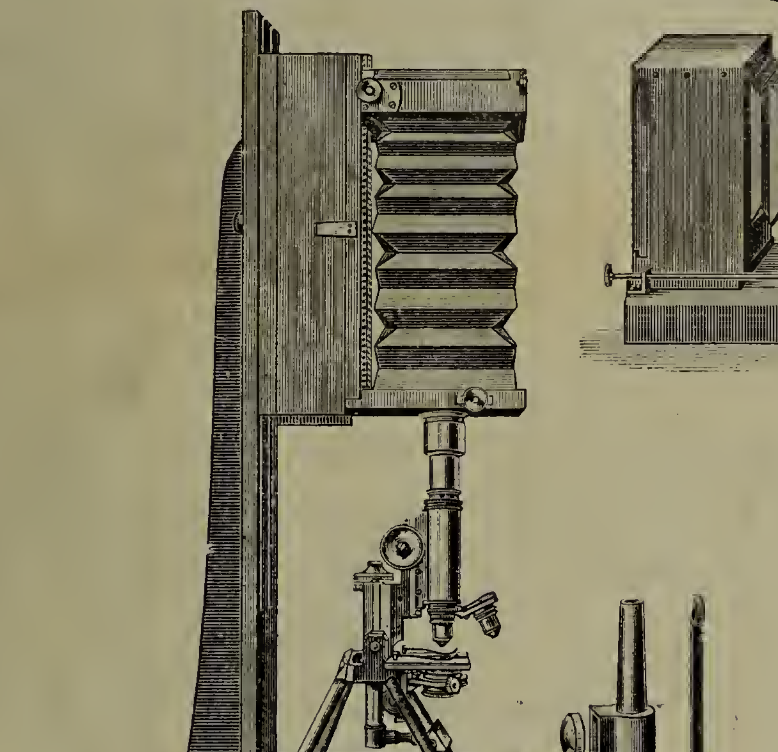


Fig. 24

FIG 24 is Messrs. Swifts' Horizontal Photo-Micrographic Apparatus. The microscope shewn attached to camera is their Fig 3 instrument with addition of swinging back leg tripod (see fig 4), this form of base gives greater steadiness to the instrument. The bellows of the camera has an extension varying from 6-in. to 30-in. The board on which the microscope and limelight jet are fixed is made to turn out of the line of the camera to facilitate adjusting the instrument and radient either limelight or paraffin lamp; when this is done the board carrying the same is turned back into a stop, which brings the microscope central with the focussing screen of the camera, And adjustment is supplied at the side of the camera, geared to the slow movement, for finely focussing the object upon the screen. A light excluding connection is fitted to the front of the camera and microscope, immediately behind this, in the bellows, is an exposing shutter which is manipulated by means of a small milled head.

Price of Camera with focussing screens, grey and patent plate and one double back	£10	0	0
Limelight Jet with fixing	1	10	0
Steel Bottle for oxygen gas, to hold 12-ft.	2	0	0
Paraffin Lamp, specially constructed, with 1-inch wick and metal chimney	3	0	0
Fig. 25 is a vertical apparatus for photographing objects in fluid. In this arrangement the camera is hinged upon the base-board so that it can be thrown aside for convenience when the microscope is being adjusted. A rack adjustment is supplied to the bellows to vary length of same	8	10	0
Large Rectangular Prism for giving parallel light, to be used in place of mirror	2	10	0
Abbe Achromatic Condenser with Iris Diaphragm	3	10	0
Price of Microscope, which is the same in both cases...	7	0	0

For Prices of Objectives, etc., see Enclosed List.

Illustrations of Spiral Rack and Pinion and Supplementary Draw Tube.

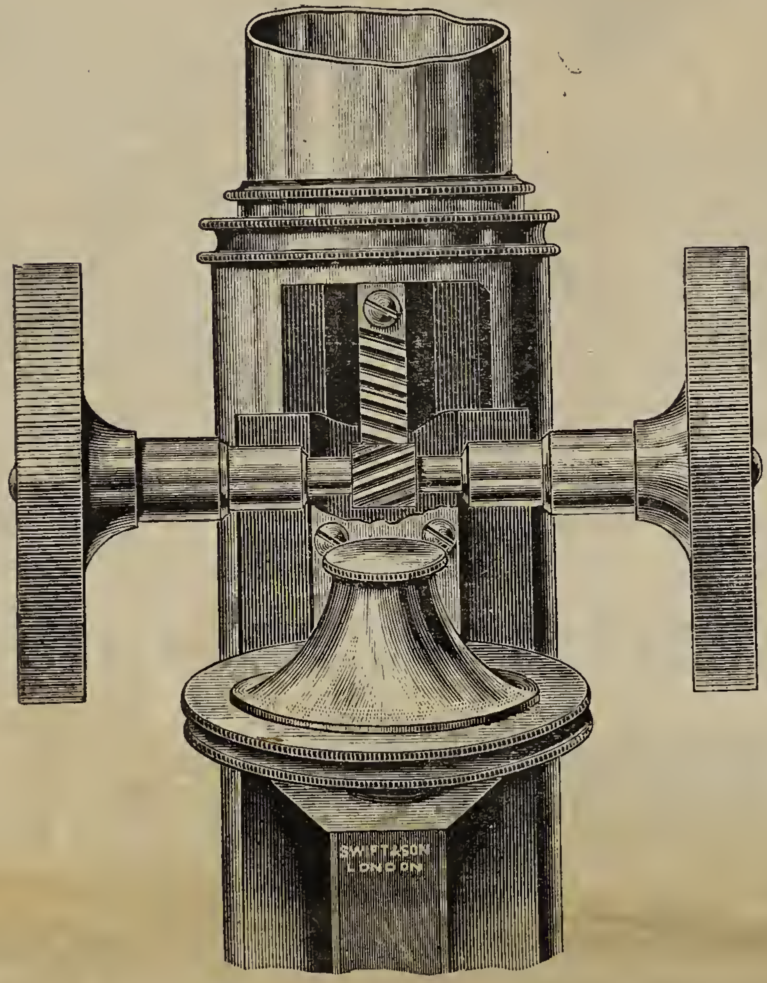


Fig. 26.

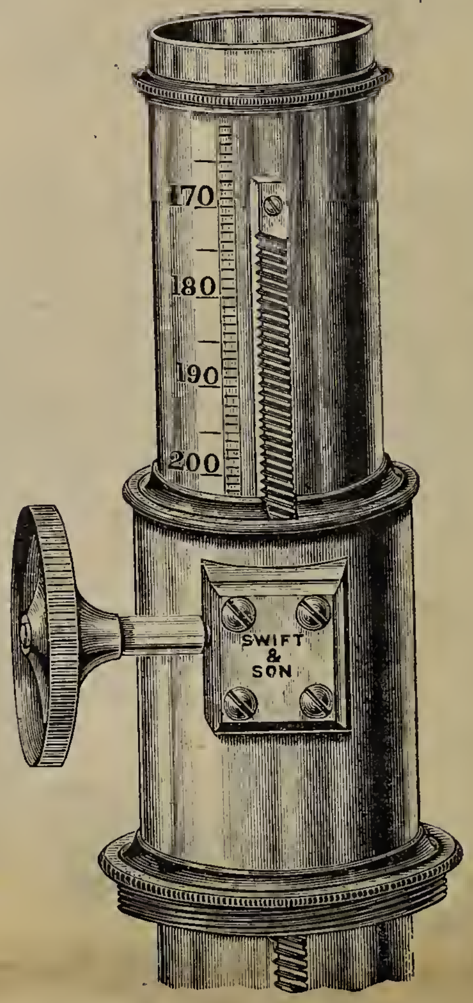


Fig. 27.—Price 25/-

FIG 26 is intended to illustrate the advantage of the spiral rack and pinion, which has been for many years fitted to all Messrs. Swift & Son's microscopes, in place of the ordinary conventional horizontal rack and pinion movement. The advantage is, that there is more gearing contact between rack and pinion, thus ensuring greater durability, thereby reducing loss time or back lash to a minimum, by less wear and tear; in addition to this, the leaves of the pinion roll into the teeth of the rack by degrees, instead of entering it entire, as would be the case in the ordinary horizontal movement, thus ensuring a very much smoother action, which, if properly made and fitted, prevents the gearing of the two being felt by the hand whilst focussing.

Messrs. Swift & Son think, in justice to themselves, the right to mention the spiral method was patented by them (*vide* Journal of the R.M.S.) and since the patent has run out it has been copied by both London and Continental opticians; this obviously shews its superiority over the old form.

Fig. 27 is a supplementary draw-tube with rack and pinion movement, which can be adapted to any of the microscopes mentioned in this circular; it will screw in place of the ordinary draw tube, the size of the thread being the same diameter in each case, so as to render the draw tubes interchangeable. The draw tube is divided into *m/m*, so that it can be extended from 160 to 250 *m/m*. The advantage of this arrangement is that the correct adjustment of any objective with each eye-piece is easily found and recorded for future observations with the same combination.